

# ONKYO SERVICE MANUAL

## STEREO CASSETTE TAPE DECK MODEL TA-RW99

### Black and silver models

UDN, UDC, UD	120V AC, 60Hz
UG	220V AC, 50Hz
UW	120 or 220V AC, 50/60Hz
UQA, UQB	240V AC, 50Hz

### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\Delta$  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

### SPECIFICATIONS

Track System:	4-track, 2-channel stereo
Erasing System:	AC erase
Tape Speed:	4.8 cm/sec (1-7/8 i.p.s.)
Wow and Flutter:	0.05% (WRMS)
Frequency Response:	20 – 15,000Hz (Normal) (30 – 14,000Hz $\pm$ 3dB) 20 – 16,000Hz (High) (30 – 15,000Hz $\pm$ dB) 20 – 17,000Hz (Metal) (30 – 16,000Hz $\pm$ 3dB)
S/N Ratio:	Dolby NR out: 58dB (metal position tape) A noise reduction of 10dB above 5 kHz and 5dB at 1kHz is possible with Dolby B. A noise reduction of 20dB at 5kHz is possible with Dolby C.
Input Jacks:	Line IN: 2 Input sensitivity: 60mV Input impedance: 50 kohms Microphone Jack: 1 Input Sensitivity: 1mV Input impedance: 5.6 kohms DIN Jack: 1 Input sensitivity: 0.1mV/ 1 kohms Input impedance: 2.2 kohms

**ONKYO®**  
**AUDIO COMPONENTS**

Outputs:	Line OUT: 2
	Standard output level: 500mV (0dB)
	Optimum load impedance: over 50 kohms
	Headphone Jack: 1
	Optimum load impedance: 8 to 200 ohms
Motors:	DIN Out Jack: 1
	Standard output level: 500mV
	Optimum load impedance: over 50 kohms
Heads:	DC servo motor: 2
	DC motor: 2
	Rec/PB: Special Hard Permalloy X 2
	Erase head: Ferrite X 1
Power Supply:	AC220V/50Hz, 120/220V, 50/60Hz, 120V/60Hz or 240V/50Hz
Power Consumption:	30 watts
Dimensions:	435(W) X 112(H) X 334(D)mm (17-1/8" X 4-7/16" X 13-1/4")
Weight:	6.5 kg (14.3 lbs.)

- Specifications and external appearance are subject change without notice because of product improvements.
- Models for use with only an AC 120V power supply are not equipped with a DIN terminal.

## SERVICE PROCEDURES

### Instruction resistance measurement

Connect the insulating-resistance tester between the plug of power supply cord and chassis.

Specifications; 500V more than 10M $\Omega$

### T-2 High Speed Adjustment

Operating the mechanism (PLAY/STOP) with TP-T2 grounded is liable to cause damage to the mechanism. Thus, follow the procedure outlined below for T-2 high speed adjustment.

1. Confirm that the mechanism is in the STOP mode.
2. Mount the test tape in T-2 and press the PLAY button.
3. Ground TP-T2 (high speed mode selected).
4. Adjust the speed (using the R793 potentiometer).
5. Disconnect TP-T2 from ground.
6. Press the STOP button.

### Adjustment of light reversal sensor

Adjustment of quick reverse sensor is made using a TDK AD 120 tape. The voltage between Pin 2 (red lead) of socket P712 (for TAPE-1) or P713 (for TAPE-2) and ground.

Insert a TDK AD 120 tape into TAPE-1 and move the magnetic section of the tape in the FWD direction. Adjust the potentiometer R12 (20 kohm) on the relay PCB which follows the TAPE-1 mechanism, until the

voltage is between 2V and 2.5V.

Adjustments are made in the same manner for TAPE-2 using R22 (20 kohm).

## FEATURES

### Two Auto-Reverse Tape Compartments

Because this deck has two auto-reverse tape compartments, it is possible to make a non-stop copy of both sides of a cassette using this deck alone. A high speed dubbing mode is also provided to cut dubbing time in half.

### Endless Auto-Reverse Relay Playback

When the reverse mode is set to repeat, both cassettes are played back alternately until the stop button of the compartment currently being used for playback is pressed.

### Dolby B and C Noise Reduction

Along with standard Dolby B NR, this deck also has the even more effective Dolby C NR system. Dolby C NR reduces tape background noise by 20dB at 5kHz, about 3 times more than Dolby B NR. In addition to its wide band noise reduction, Dolby C NR uses a sliding band technique that varies the bandwidth of noise reduction according to the input level, thereby avoiding noise "pumping." Dolby C NR also has an anti-saturation effect to reduce the chance of tape saturation in the high range. All these features combine to eliminate the adverse effects on tape sound that other noise reduction systems can cause.

### Auto Music Control System (AMCS)

Tape compartment 1 is equipped with the AMCS function which automatically plays the first 10 seconds of every song on a cassette in the current direction of playback. To stop AMCS and resume normal playback from that point, just press the play button. This is very useful when copying cassettes, too.

### Direct Song Location

This deck is equipped with a direct access function that winds the tape in either compartment directly to the beginning of any song up to 15 songs away from the present location in either direction.

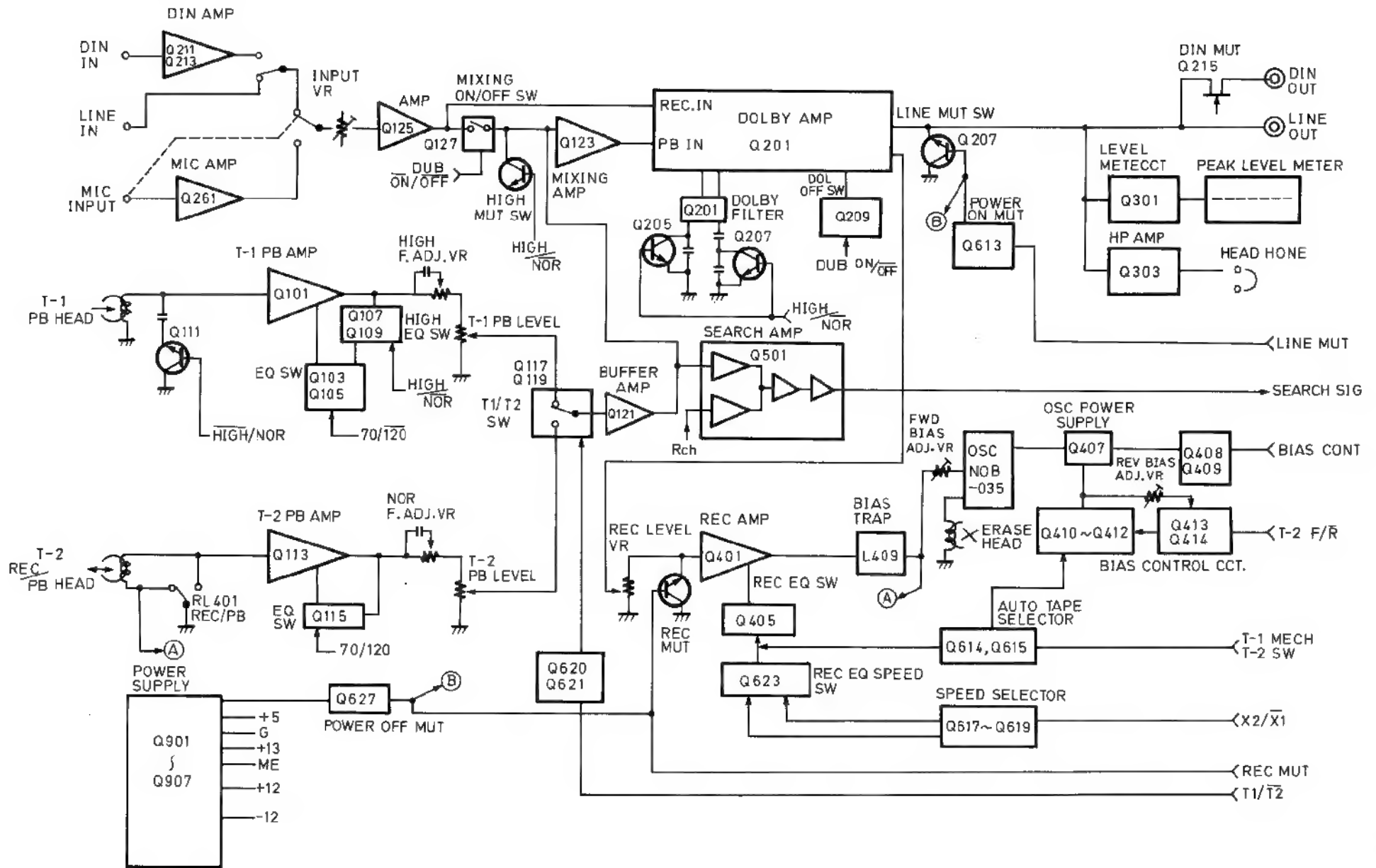
### Search Dubbing Function

If the search dubbing button is pressed during a 10 second AMCS playback interval or the normal playback mode of the tape 1 holder while the tape 2 holder is in the dubbing pause mode, the cassette in the tape 1 holder is rewound to the beginning of the current song and dubbing is automatically started.

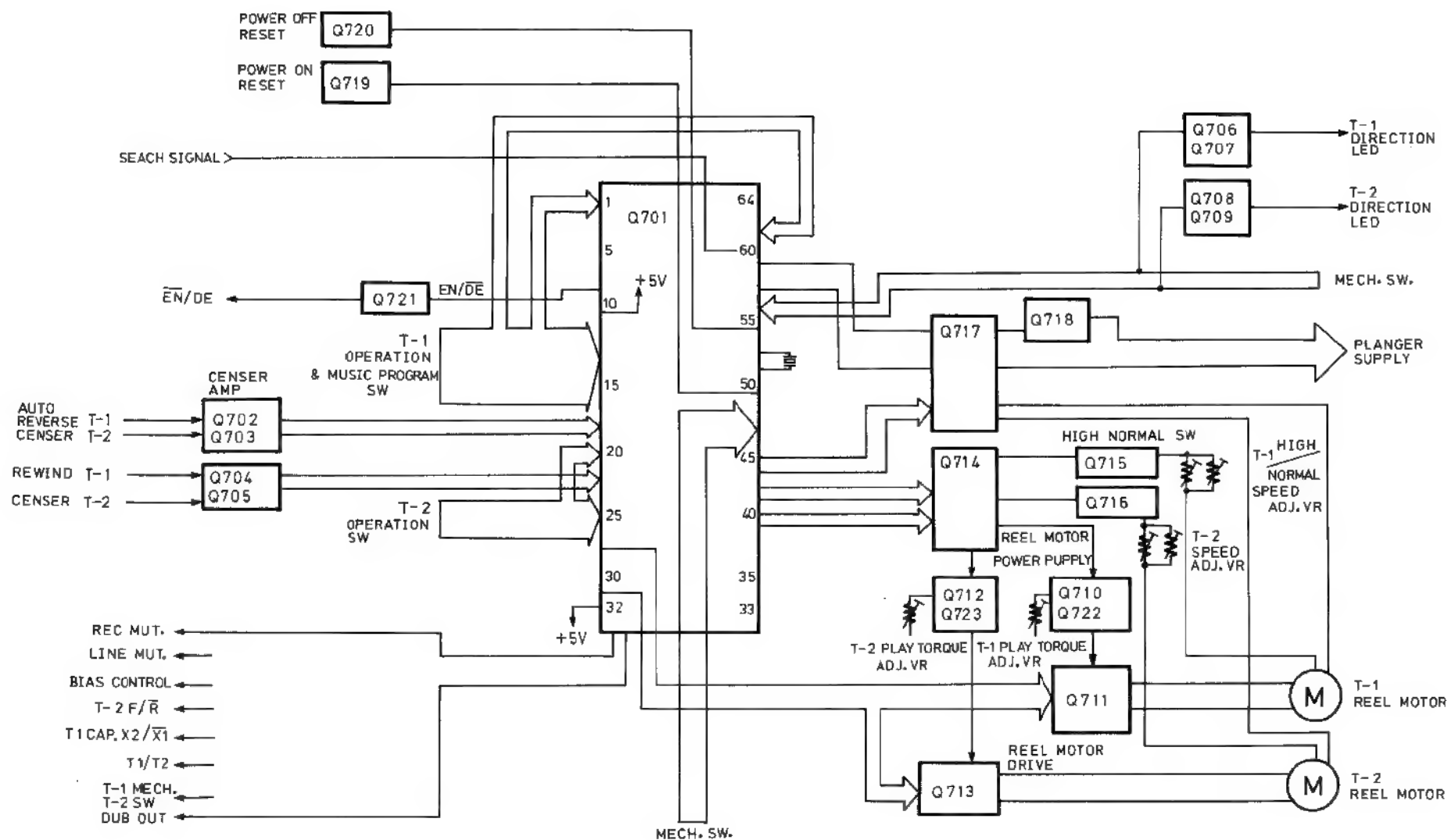
### Many Other Useful Features

In addition to the above-mentioned features, this deck also has a mic mixing capability, an auto space rec mute button, fully automatic tape selection and easy-to-read peak level meters.

### BLOCK DIAGRAM (AMPLIFIER SECTION)



# BLOCK DIAGRAM (CONTROL SECTION)



## 1. Mechanism

This mechanism uses a power assist system provided by the capstan motor, and it consists of one capstan motor, reel motor, and solenoid. There are five operation modes: STOP, FWD PLAY, REV PLAY, FWD, and CUE/REV. These modes are selected in the cycle shown in Fig. 1, according to the solenoid trigger and the revolution of the intermittent gear obtained from the flywheel. The FWD PLAY mode is selected from the STOP mode by attracting the solenoid for 60ms, and the REV PLAY mode is selected by attracting it for 320ms. If the solenoid is attracted in the PLAY mode, the CUR/REV mode is selected during this interval, and if power to the solenoid is cut off, the STOP mode is selected. The direction of the head in the STOP mode is always towards FWD. There is a leaf switch for direction indication which retains the direction of the mechanism prior to selection of the STOP mode. This mechanism is equipped with another leaf switch called the play switch. This switch allows for confirmation of the head position. It is ON in the PLAY and CUE/REV positions, and OFF in the STOP position. This switch is used for initialization of the mechanism when the power is turned on, and for detection of mechanism trouble during operation.

The solenoid attraction time for selecting the PLAY mode from the STOP mode and the construction of the mechanism is such that the capstan motor rotates at a fixed speed. When high speed dubbing is selected, the high speed mode is switched to after operation of the mechanism is completed.

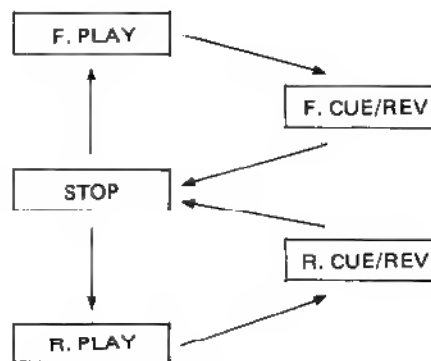


Fig. 1

## 2. Microprocessor

The LM6402 and LM6405 series devices used in conventional cassette recorders were NMOS microprocessors with the output port being the open drain of the N-channel MOS transistor. This unit uses a CMOS microprocessor with pins #1 to #19 and #58 to #64 being high voltage ports capable of handling voltage between +5V and -35V. The output port is the open drain of the PMOS transistor. The other output ports are the open drain of the conventional NMOS transistors. Fig. 2 and 3 show the equivalent circuits of the input and output ports for both types of transistors. As can be seen in the diagrams, the current flow for the PMOS output port is from the IC, and thus directly grounding the port is liable to damage the IC.

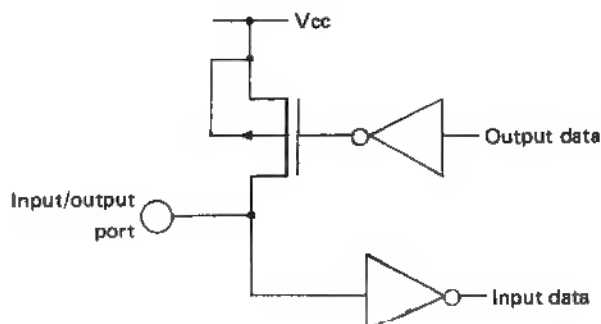


Fig. 2 PMOS open drain Input/output port

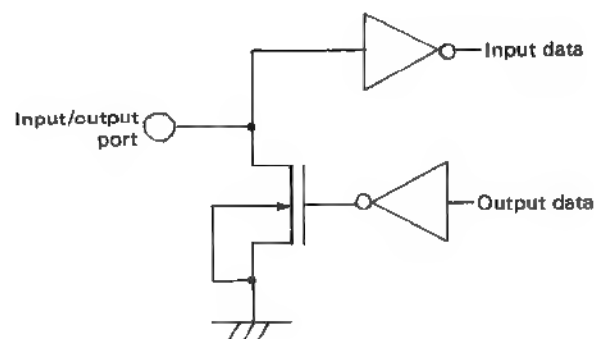




Fig. 3 NMOS open drain Input/output port

## 3. Port functions

Port number	Function
1 ~ 5	Output ports for LEDs. Directly drive the DUBBING, DUBBING x 2, REC, REC/PAUSE, and PRESET LEDs.
6	Output port tuning the bias oscillator ON/OFF
7	Output port for switching the REC/PB relay for T2
8	Output port for encode/decode switching of Dolby IC
9	Output port for selecting T1/T2 for playback
10	Both the input port for switching of Pin #61 ~ #64 functions and output port for selection of input signal for EQ dubbing
11 ~ 17 20, 21 24 ~ 27	Input ports for various function keys
18, 19	Input ports for light reversal signal used for T1 and T2 lead tape detection
22, 23	Input ports for revolution signal used for T1 and T2 tape end detection
28 ~ 31	Output ports used for T1 and T2 reel motor control
33	Output port used for TIMER REC/PB/OFF detection
34	Input port for MODE  /  detection
35, 36	Both input ports for T1 and T2 play switch and TIMER/REC/PB/OFF detection
37, 38	LINE MUTE and REC MUTE output ports
39, 40	Output ports for T1 and T2 O-PLAY
41, 42	Output ports for speed control of T1 and T2 capstan motor
43, 44	Output ports for turning T1 and T2 capstan motor ON/OFF
45, 46	Input ports for detection of T2 accidental recording prevention tab
47, 48	Input ports for T1 and T2 cassette loading
49	RESET input (positive logic)
50	TEST input for microprocessor IC (normally)
51, 52	Oscillator connection ports for clock
53	GND
54	Input port for POWER-OFF detection
55, 56	Input port for T1 and T2 direction detection
57	Power amplifier for increasing the attraction when the solenoids for T1 and T2 are driven
58, 59	Output ports driving T1 and T2 solenoids
60	Port for search signal input for selection of songs
61	Key input port for SEARCH DUBBING
62	Key input port for AMSC
63	Output port for T2 PLAY LED
64	Output port for T1 PLAY LED

# PRINTED CIRCUIT BOARD PARTS LIST

## Control pc board (NACOC2443)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>ICs</b>		
Q701	222920	HD614042S-C35
Q702,Q703	222465 or 222808	NJM4558D or M5218P
Q711,Q713	222862	LB1640N
Q714	222919	TD62554S
Q717	222689	LB1287
<b>Transistors</b>		
Q704-Q709	2212485 or 2210746	JC501(Q) or 2SC945(AP)
Q710,Q712	2201594 or 2201595	2SD1189(Q) or 2SD1189(P)
Q715,Q716	2212302, 2212303, 2212304 or 2211944	2SK381(B), 2SK381(C), 2SK381(D) or 2SK246(V)
Q718	2211554	2SA562TMY
Q719,Q720	2212494, 2212124 or 2211454	JA101(P), 2SA1048(Y) or 2SA1015(Y)
Q721-Q723	2212485 or 2210746	JC501(Q) or 2SC945(AP)
<b>Diodes</b>		
D701-D708	223155	1SS138
D709	223848	GP08B
<b>Ceramic oscillator</b>		
X701	3010099	CSA4, OOMG
<b>Capacitors</b>		
C701,C702	352742209	2.2 $\mu$ F, 16V, Elect.
C710-C712	352780109	1 $\mu$ F, 16V, Elect.
C713	352741009	10 $\mu$ F, 16V, Elect.
<b>Resistors</b>		
R708-R714	49163392407	3.9K $\Omega$ $\times$ 7, 1/10W, Network
R723-R734	49163392412	3.9K $\Omega$ $\times$ 12, 1/10W, Network
R742-R751	49163392410	3.9K $\Omega$ $\times$ 10, 1/10W, Network

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R752-R755	49163392404	3.9K $\Omega$ $\times$ 4, 1/10W, Network
R757-R761	49163392405	3.9K $\Omega$ $\times$ 5, 1/10W, Network
R704,R779	441524794NF	0.47 $\Omega$ 1/2W, Metal oxide film
R798	441722204NF	22 $\Omega$ , 2W, Metal oxide film
R812,R813	441622704	27 $\Omega$ , 2W, Metal oxide film
R777,R782	5215020	NO8HR5KBC, Semi-fixed
R786,R789,	5215021 or	NO8HR10KBC, Semi-fixed
R793,R796	5215045	
R784,R791	4000103	1.2K $\Omega$ , 1/4W, LPTC-R

### Plugs

P701	25055134	NPLG-4P-118
P702	25055135	NPLG-5P-119
P703	25055136	NPLG-6P-120
P704,P705	25055138	NPLG-8P-122
P706,P709	25055132	NPLG-2P-115
P710	25055133	NPLG-3P-117
P711	25055138	NPLG-8P-122
P712-P715	25055133	NPLG-3P-117
P716	25055188	NPLG-7P-172
P717	25055190	NPLG-9P-174

## Tape-1 display pc board (NSW-2447)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D717-D719	225192	GL-1NG1, LED
P716A	2000491A	NSAS-13P-447, socket

## Tape-2 display pc board (NASW-2448)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D720,D722, D724	225192	GL-1NG1, LED
D721,D723	225190	GL-1PR, LED
P717A	2000492A	NSAS-17P-449, socket

## Power switch pc board (NASW-2331)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C921	3500065A	0.01 $\mu$ F, 400V, capacitor IS
S901	25035375	NPS-111-L339P, power switch

# ADJUSTMENT PROCEDURES

## PRECAUTIONS

- Before adjustment, clean the following parts with an alcohol moistened swab.
  - \* record/playback head
  - \* erase head
  - \* pinch roller
  - \* capstan
- Do not use magnetized screwdriver for adjustments.
- Demagnetize record/playback head with a head demagnetizer.

## TEST EQUIPMENT/TOOLS REQUIRED:

Audio oscillator

Digital frequency counter

Oscilloscope

Attenuator

AC voltmeter

Non-magnetic screw driver

Blank tapes (completely erased)

NORMAL ..... NEW UD90

HIGH ..... NEW XL-II90

METAL ..... NEW MX60

Test tapes

VTT-658 : 10 KHz, -15dB

MTT-111 : 3 kHz, -10dB

MTT-150 : Dolby level calibration  
400Hz, tone 200nWb/m

Item		Connection of instrument	Line input	Test tape	Mode	Output indicator	Adjustment point	Adjust	Remarks
1	Playback torque			TW-2111	PB	TW-2111	T-1 R-777 T-2 R-782	40 g-cm	NACOC-2443
2	T-1 H. speed  N. speed	Frequency counter to LINE output terminal		MTT-111	Dubbing	Frequency counter	Semi-fixed R-786	6,040 to 6,050 Hz 3,030 to 3,040 Hz	Dolby OFF
	T-2 H. speed  N. speed				PB  PB		Semi-fixed R-793  R-796		
3	Head azimuth	AC voltmeter and oscilloscope to LINE output terminal		VTT-658	PB	AC voltmeter	Head azimuth screw	Maximum and same phase at channels L and R	See fig. 1
4	Playback F. ADJ			TCC-173A	PB	AC voltmeter	T-1 R-131, R-132 T-2 R-157, R-158	Same level at 315Hz/10kHz	High speed Normal speed
5	Playback level	AC voltmeter to terminals TP-1 and TP-2		MTT-150	PB	AC voltmeter	T-1 R-133, R-134 T-2 R-159, R-160	300mV	
6	Bias current	Fig. 2	1 kHz, -20dB and 12kHz, -20dB	NEW XL-II90	FWD REC/PB	AC voltmeter	R-449 (Ch. L) R-450 (Ch. R)	Same level at REC/PB	Input VR maximum
					REV REV/PB		R-459 (L. Rch)		
7	Record level	Fig. 2	1 kHz		REC PAUSE	AC voltmeter	Attenuator or AF OSC output	350mV	Input VR maximum
					REC/PB	AC voltmeter	R-401 (Ch. L) R-402 (Ch. R)	Same level at REC/PB	



## NCAF-2438

R459  
REV  
BIAS ADJ

TP2

R402 (Rch)  
REC LEVEL

R401 (Lch)  
REC LEVEL

TP1

FWD. BIAS ADJ  
R449 R450

Lch Rch

T-2 R157 (Lch)  
F. ADJ

T-2 R159 (Lch)  
P.B. LEVEL

T-2 R160 (Rch)  
P.B. LEVEL

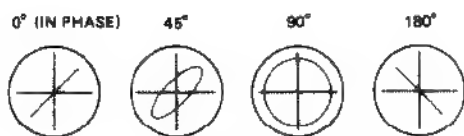
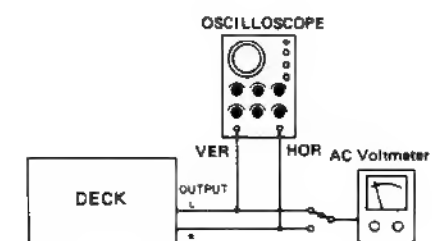
T-2 R158 (Rch)  
F. ADJ

T-1 R131 (Lch)  
F. ADJ

T-1 R133 (Lch)  
P.B. LEVEL

T-1 R134 (Rch)  
P.B. LEVEL

T-1 R132 (Rch)  
R. ADJ



Confirming phase relationship

fig-1

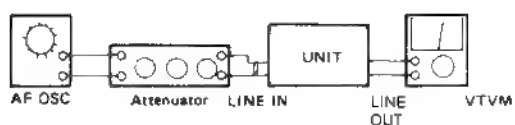


fig-2

T-2 R793  
T-1 R786 H. SPEED  
T-1 R789 N. SPEED  
R796  
T-2 TP-T2

32 1  
Q701  
33 64

PLAY TORQUE

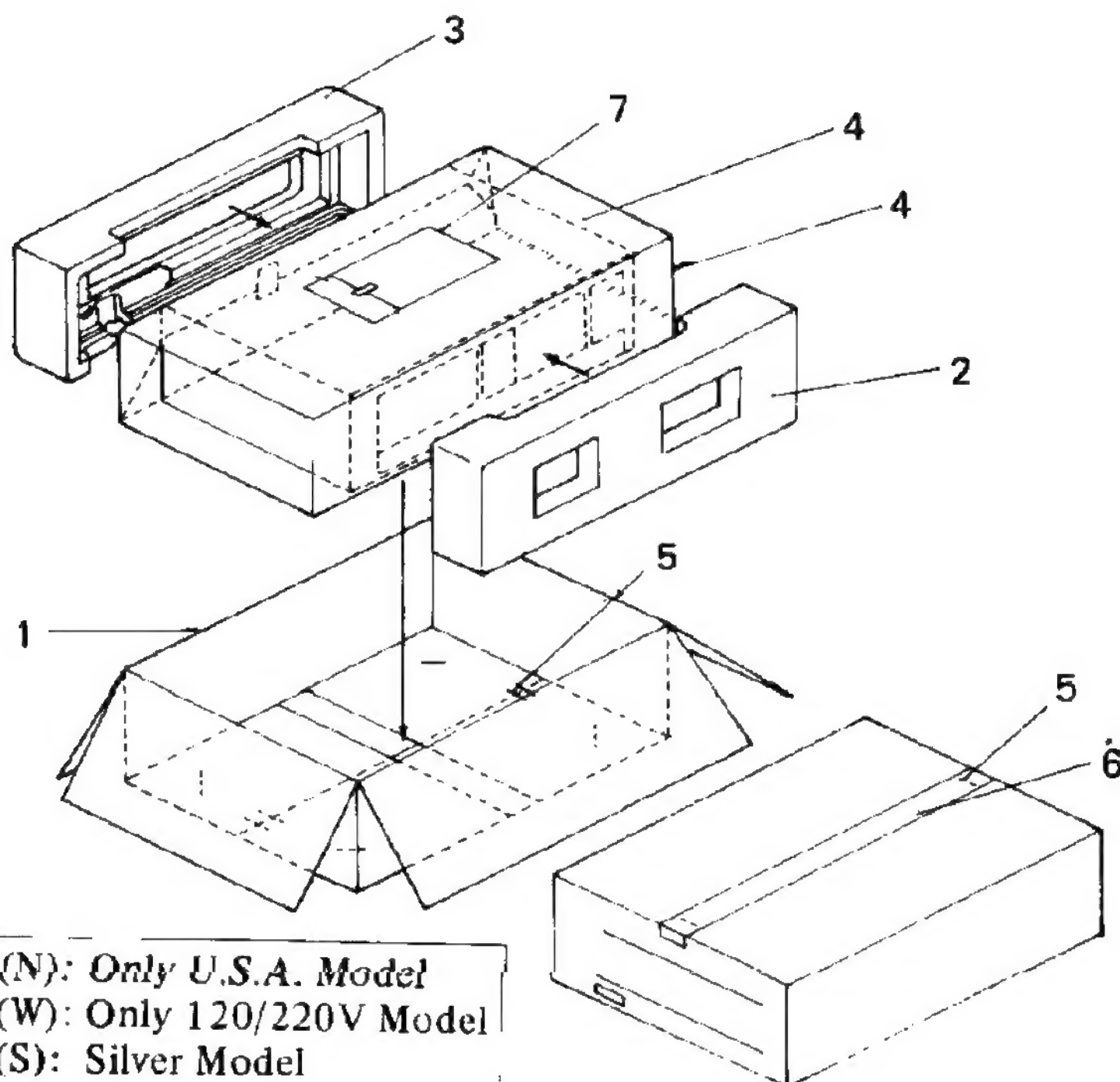
R777 R782  
T-1 T-2

NCCOC-2443

# CHASSIS-EXPLODED VIEW PARTS LIST

REF NO.	PARTS NO.	DESCRIPTION	REF NO.	PARTS NO.	DESCRIPTION
A2	27120760A	Back bracket (D)	A514	28400245	Windor (T1)
	27120767A	Back bracktt (G)	A515	27262373A	Plate (S1)
A3	27300750	Strainrelief	A516	27262397	Plate (W1) (S)
A4	834430068	3TTS+6B (BC), Screw		27262399	Plate (W1) (B)
A6	27110257B	Front bracket	A518	28400246	Window (T2)
A7	27141027	Bracket (Counter)	A519	27262374A	Plate (S2)
A8	27141028	Bracket (MIC)	A520	27262398	Plate (W2) (S)
A9	82142003	2P+3F (BC), Screw		27262400	Plate (W2) (B)
A10	834430068	3TTS+6B (BC), Screw	A522	27170212	Bottom board
A12	27130405	Bracket (PT)	A523	27175028	Lag
A13	870065	Special washer	A527	28321928	Knob (POW) (S)
A14	830440089	4TTC+8C (BC), Screw		28321905B	Knob (POW) (B)
A15	834430108	3TTS+12B (BC), Screw	A528	28320797	Knob (SEL) (S)
A17	27115194	Side bracket		28321130	Knob (SEL) (B)
A19	24601147	Counter	A529	28322268	Knob (MODE) (S)
A20	834426068	2.6TTS+6B (BC), Screw		28322269	Knob (MODE) (B)
A22	27190351A	Holder (POW)	T901	△ 2300021	NPT-892D, Power transformer (D)
A23	27190556	Holder		2300022	NPT-892G, Power transformer (G)
A24	833430080	3TTP+8B (BC), Screw		2300023	NPT-892DG, Power Transformer (W)
A25	27273037A	Joint (L)	P1	△ 253112	AS-UC-4, Power supply cord (D)
A26	27190369	Holder		253128	AS-CEE, Power supply cord (G/W)
A27	27190331	Holder (KED)	S902	△ 25065123	NSS-1258P, Voltage selector (W)
A28	28140488	Cushion	A530	29055419	Sheet 44 × 35
A29	831430100	3TTW+10P (BC), Screw	Z1	244084	NDM-76, Tape mechanism ass'y for T-1
A32	831430088	3TTW+8B (BC), Screw	Z2	244085	NDM-77, Tape mechanism ass'y for T-2
A34	28322336A	Knob (EJ) (S) ✕	C721,C722	352942206	22μF, 16V, Nom-poler elect
	28322337A	Knob (EJ) (B) ✕	U1	15008538	NAAF-2438, Main pc board ass'y
A35	27260201A	Shaft (EJ)		15008538A	NAAF-2438A, Main pc board ass'y (G/W)
A37	28322279B	Knob (T1) ass'y (S)	U2	15008539	NAMIC-2439, Mic, pc board ass'y
	28322280B	Knob (T1) ass'y (B)	U3	15008540	NAVR-2440, Input volum pc board ass'y
A38	28322251	Knob (slide) (S)	U4	15008541	NASW-2441, Dolby switch pc board ass'y
	28322271	Knob (slide) (B)	U5	15008542	NAHP-2442, Headphone terminal
A39	27190403A	Holder (LEV) (S)			pc board ass'y
	27190411A	Holder (LEV) (B)	U6	15008543	NACOC-2444, Control PC board ass'y
A40	27260198	Shaft	U7	15008544	NASW-2444, T-1 Operation
A43	28322254B	Knob (T2) ass'y (S)			switch pc board ass'y
	28322281B	Knob (T2) ass'y (B)	U8	15008545	NASW-2445, T-2 Operation
A301	28184296	Top cover (S)			switch pc board ass'y
	28184298	Top cover (B)	U9	15008546	NASW-2446, Timer switch pc
A501	15008121	Front panel ass'y (S)			board ass'y
	15018121	Front panel ass'y (B)	U10	15008547	NADIS-2447, T-1 Display pc
A507	27262369	Plate(T1) (S)			board ass'y
	27262370	Plate (T1) (B)	U11	15008548	NADIS-2448, T-2 Display pc
A508	27262371	Plate (T2) (S)			board ass'y
	27262372	Plate (T2) (B)	U12	11488531	NASW-2331, Power switch pc
A510	28133149	Back plat			board ass'y
A512	28191327A	Clear plate			
A513	28400215A	Cassettelid			

## PACKING VIEW PARTS LIST



NOTE: (N): Only U.S.A. Model  
(W): Only 120/220V Model  
(S): Silver Model  
(B): Black Model

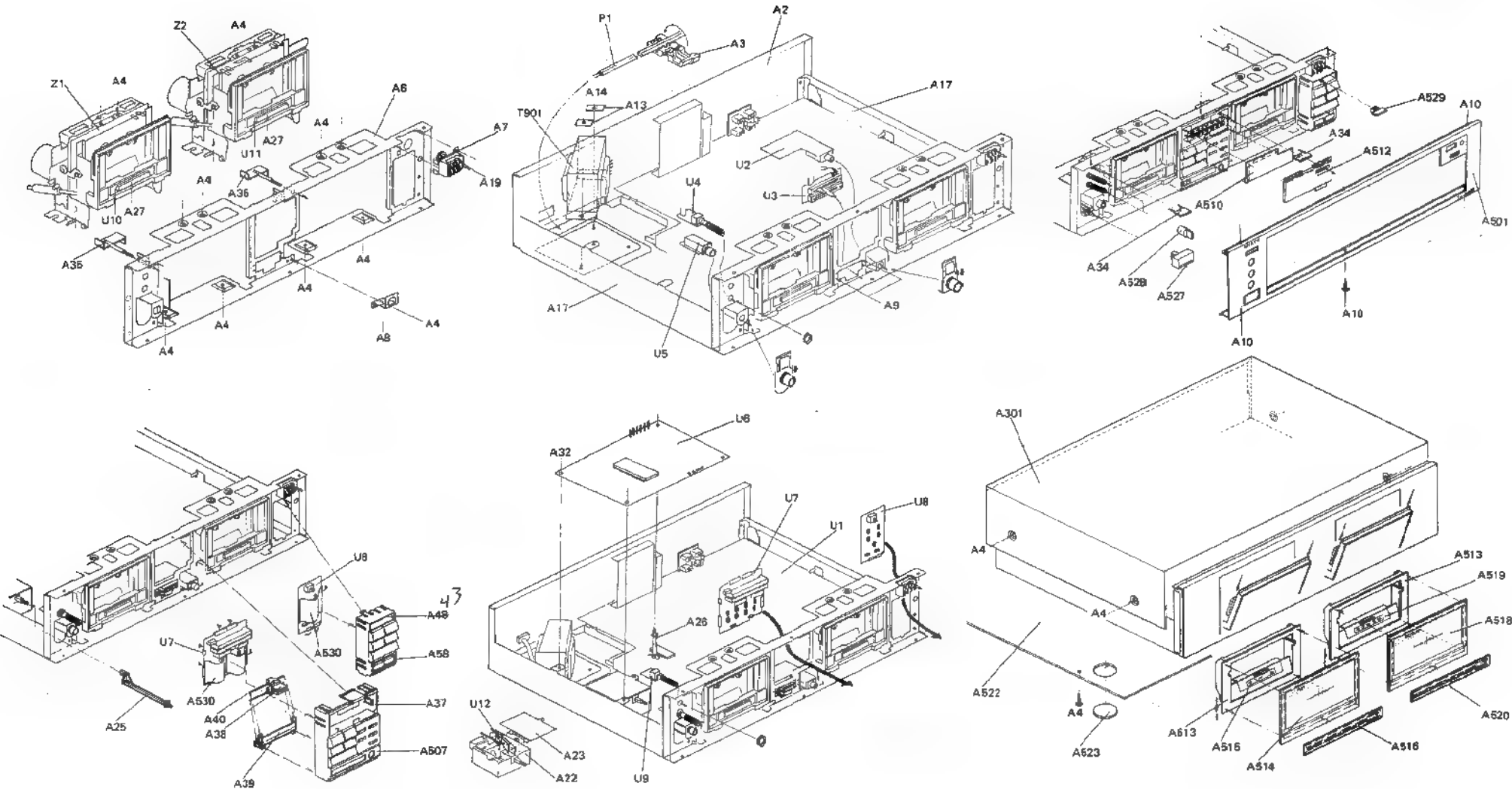
### D Model

REF NO.	PART NO.	DESCRIPTION
1	29051207	Master carton box (S)
	29051209	Master carton box (B)
2	29091037	Pad (F)
3	29091038A	Pad (B)
4	29100034A	850 × 650 Poly bag
	29095019-1	800 × 600 Protection sheet
5	282301	Sealing hook
6	260012	Damplon tape
7		Accessory bag ass'y
	29340936	Instruction manual
	2010095	Connection cable
	29365006-7	Waranty card (N)
	29358002C	Service station list (N)
	29100006A	350 × 250 Poly bag

### G/W Model

REF NO.	PART NO.	DESCRIPTION
1	29051207	Master carton box (S)
	29051209	Master carton box (B)
2	29091037	Pad (F)
3	29091038A	Pad (B)
4	29100034A	850 × 650 Poly bag
	29095019-1	800 × 600 Protection sheet
5	282301	Sealing hook
6	260012	Damplon tape
7		Accessory bag ass'y
	29340937	Instruction manual
	2010095	Connection cable
	25055040	Conversion plug (CV-K-2) (W)
	29100006A	350 × 250 Poly bag

CHASSIS-EXPLODED VIEW



# CH PRINTED CIRCUIT BOARD PARTS LIST

## MAIN CIRCUIT PC BOARD (NAAF-2438)

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>				
Q101, Q102	222655	NJM4562DD	Q902	2212494,	JA101(P),
Q113, Q114	222655	NJM4562DD		2212124 or	2SA1048(Y) or
Q123-Q126	222736	NJM4558S		2211454	2SA1048(Y)
Q201	222910	HA-17088	Q903	2201604 or	2SB891(Q) or
Q301, Q302	222623	IR2E02		2201605	2SB891(R)
Q303, Q304	222652	M5218L	Q904	2212485 or	JC501(Q) or
Q401, Q402	222671 or	NJM4556DD or		2210746	2SC945(AP)
	222808	M5218P	Q905	2201074,	2SD880(Y),
Q405, Q406	222918	BA6251		2201385 or	2SD330(E) or
Q501	222681 or	IR3702 or		2201035	2SD325(E)
	222695	LA6324	Q907	2212304 or	2SK381(D) or
Q623	222918	BA6251		2211945	2SK246(GR)
Q901	222780122	78M12			
Q906	222780050	7805			
	<b>Transistors</b>			<b>Diodes</b>	
Q102-Q112,	2212485 or	JC501(Q) or	D101-D104	223145,	1S2076TD,
Q115, Q116	2210764	2SC945(AP)		223124 or	1S2473 or
Q117, Q120,	2212302,	2SK381(B),	D105, D106	223150	US1040
Q127, Q128	2212303,	2SK381(C),	D401	223155	1SS138
	2212304,	2SK381(D),		223145,	1S2076TD,
	2211944 or	2SK246(Y) or		223124 or	1S2473 or
	2211945	2SK246(GR)		223150	US1040
Q121, Q122	2212485 or	JC501(Q) or	D402-D403	2239673,	RD15EB3,
	2210746	2SC945(AP)		2239691,	RD16EB1,
Q129, Q130	2211705,	2SD655(E),		2243253 or	MTZ15C or
	2211706,	2SD655(F),		2243261	MTZ15A
	2212793,	2SD1468(Q),	D404	2239672 or	RD15EB2 or
	2212794 or	2SD1468(R) or		2243252	MTZ15B
	2212795	2SD1468(S)	D501	223145,	1S2076TD,
Q202-Q206	2212485 or	JC501(Q) or		223124 or	1S2473 or
	2210746	2SC945(AP)		223150	US1040
Q207, Q208	2211705,	2SD655(E),	D601	223132	1K60
	2211706,	2SD655(F),	D602	223155	1SS138
	2212793,	2SD1468(Q),	D603-D607	223145,	1S2076TD,
	2212794 or	2SD1468(R) or		223124 or	1S2473 or
	2212795	2SD1468(S)		223150	US1040
Q209	2212458 or	JC501(Q) or	D201, D202	223145,	1S2076TD, (G/W)
	2210746	2SC945(AP)		223124 or	1S2473 or
Q211-Q214	2212485 or	JC501(Q) or (G/W)		223150	US1040
	2210746	2SC945(AP)	D609	2239671,	RD15EB1,
Q215, Q216	2212302,	2SK381(B), (G/W)		2239672,	RD15EB2,
	2212303,	2SK381(C),		2243251 or	MTZ15A or
	2212304,	2SK381(D),		2243252	MTZ15B
	2211944 or	2SK246(Y) or	D610	223145,	1S2076TD,
	2211945	2SK246(GR)		223124 or	1S2473 or
Q403, Q404	2212458 or	JC501(Q) or		223150	US1040
	2210746	2SC945(AP)	D611	2239471 or	RD5.6EB1 or (G/W)
Q407	2201540 or	2SD947 or		2243151	MTZ5.6A
	2201060	2SD549	D612	223155	1SS138
Q408, Q502	2212494,	JA101(P),	D613	223145,	1S2076TD,
	2212124 or	2SA1048(Y) or		223124 or	1S2473 or
	2211454	2SA1015(Y)		223150	US1040
Q409-Q414,	2212485 or	JC501(Q) or	D901, D902	223868 or	2W02 or
Q611, Q617	2210746	2SC945(AP)		223889	RC202
Q612-Q616,	2212494,	JA101(P),	D903, D906,	223145,	1S2076TD,
Q618, Q619	2212124 or	2SA1048(Y) or	D907	223124 or	1S2473 or
	2211454	2SA1015(Y)		223150	US1040
Q620-Q622	2212485 or	JC501(Q) or	D904	2239672 or	RD15EB2 or
	2210746	2SA945(AP)		2243252	MTZ15B
Q624, Q627	2212494,	JA101(P),			
	2212124 or	2SA1048(Y) or		<b>Coils</b>	
	2211454	2SA1015(Y)	L201, L202	233309	NMC-6046
Q625, Q626	2212485 or	JC501(Q) or	L203, L204	233245	NMC-2029
	2210746	2SC945(AP)	L401, L402	233192 or	NCH-1037 or
				231042	NCH-2082
			L403, L404	24606069 or	NCH-1007 or
				231039	NCH-2079

CIRCUIT NO.	PARTS NO.	DESCRIPTION
L405, L406	24606080 or 231038	NCH-1022 or NCH-2078
L407, L408	24606076 or 231037	NCH-1014 or NCH-2077
L409, L410	233283	NCH-4060
L411, L412	231025	NCH-1064
<b>OSC Block</b>		
Z401	231070	NOB-035
<b>Capacitors</b>		
C111, C112	352721019	100 $\mu$ F, 6.8V, Elect.
C115, C116	352780339	3.3 $\mu$ F, 50V, Elect.
C117, C118	352741009	10 $\mu$ F, 16V, Elect.
C149, C150	352721019	100 $\mu$ F, 6.3V, Elect.
C153, C154	352780339	3.3 $\mu$ F, 50V, Elect.
C155, C156	352741009	10 $\mu$ F, 16V, Elect.
C157	352780109	1 $\mu$ F, 50V, Elect.
C165, C166	352780339	3.3 $\mu$ F, 50V, Elect.
C167-C170	352750479	4.7 $\mu$ F, 25V, Elect.
C201, C202	352783399	0.33 $\mu$ F, 50V, Elect.
C203, C204	352780109	1 $\mu$ F, 50V, Elect.
C211-C216	352741009	10 $\mu$ F, 16V, Elect.
C221, C222	352780109	1 $\mu$ F, 50V, Elect.
C223, C224	352786899	0.68 $\mu$ F, 50V, Elect.
C225, C226	352780229	2.2 $\mu$ F, 50V, Elect.
C233, C234	352786899	0.68 $\mu$ F, 50V, Elect.
C235, C236	352782009	2.2 $\mu$ F, 50V, Elect.
C257	352734719	470 $\mu$ F, 10V, Elect.
C258	352742209	22 $\mu$ F, 16V, Elect.
C239	352780109	1 $\mu$ F, 50V, Elect.
C251, C252	392880107	1 $\mu$ F, 50V, LL. (G/W)
C253, C254	352780109	1 $\mu$ F, 50V, Elect. (G/W)
C255, C256	352741019	100 $\mu$ F, 16V, Elect. (G/W)
C301, C302	352741009	10 $\mu$ F, 16V, Elect.
C303, C304	352780109	1 $\mu$ F, 50V, Elect.
C305, C306	352750479	4.7 $\mu$ F, 25V, Elect.
C401, C402	352741009	10 $\mu$ F, 50V, Elect.
C403, C404	352750479	4.7 $\mu$ F, 25V, Elect.
C405, C406	352781599	0.15 $\mu$ F, 50V, Elect.
C407, C408	352780339	3.3 $\mu$ F, 50V, Elect.
C433	352750479	4.7 $\mu$ F, 25V, Elect.
C434	352722219	220 $\mu$ F, 6.3V, Elect.
C507	352741009	10 $\mu$ F, 16V, Elect.
C508, C509	352780109	1 $\mu$ F, 50V, Elect.
C601	352780109	1 $\mu$ F, 50V, Elect.
C602, C603	352741009	10 $\mu$ F, 16V, Elect.
C604, C605	352780109	1 $\mu$ F, 50V, Elect.
C903, C904	357261029	1000 $\mu$ F, 35V, Elect.
C905	352781099	0.1 $\mu$ F, 50V, Elect.
C906, C907	352741009	10 $\mu$ F, 16V, Elect.
C908	352752229	2200 $\mu$ F, 25V, Elect.
C909	352742219	220 $\mu$ F, 16V, Elect.
C910	352744709	47 $\mu$ F, 16V, Elect.
C911	3504168	13000 $\mu$ F, 25V, Elect.
C912	352782299	0.22 $\mu$ F, 50V, Elect.
C913	352781099	0.1 $\mu$ F, 50V, Elect.
C915	352744719	470 $\mu$ F, 16V, Elect.
C916	352782299	0.22 $\mu$ F, 50V, Elect.
C918	352780229	2.2 $\mu$ F, 50V, Elect.
<b>Resistors</b>		
R131-R134,	5215003 or	N08HR20KBC,
R157-R160	5215022	Semi-fixed
R401, R402	5215045 or	N08HR10KBC,
	5215021	Semi-fixed
N449, R450	5215047 or	N08HR100KBC,
	5215024	Semi-fixed
R459	5215003 or	N08HR20KBC,
	5215022	Semi-fixed
R901, R902	441520224NF	2.2 $\Omega$ , 1/2W, Metal oxide film

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R906	441524794NF	0.47 $\Omega$ , 1/2W, Metal oxide film
R908	441721804NF	18 $\Omega$ , 1W, Metal oxide film
<b>Plugs</b>		
P101	25055101	NPLG-4P-85
P102	25055103	NPLG-6P-87
P301	25050248	NSCT-7P-76
P302	25050249	NSCT-8P-77
P401	25055100	NPLG-3P-84
<b>Sockets</b>		
P104A	2000498A	NSAS-6P-454
P202	25050064	NSCT-5P18 DIN (G/W)
P701A	2000493	NSAS-4P-449
P702A	2000494	NSAS-5P-450
P703A	2000495	NSAS-6P-451
P103	25045142	NPI-4P-DBL55

**MIC. TERMINAL PC BOARD (NAMIC-2439)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>IC</b>		
Q261	222502, 222534 or 222811	NJM4558DX, NJM4559DX or NJM4558DD
<b>Capacitors</b>		
C264, C265	352741009	10 $\mu$ F, 16V, Elect.
<b>Terminal</b>		
P201	25045135	HLJ4307-01-010

**INPUT VOLUME PC BOARD (NAVR-2440)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Resistors</b>		
R163, R164	6142030	N30LL50KA10Z
<b>Socket</b>		
P105A	2000499A	NSAS-6P-455

**DOLBY SWITCH PC BOARD (NASW-2441)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Switch</b>		
S601	25030231	NRS-123-25SBM

**HEADPHONE TERMINAL PC BOARD (NAHP-2442)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Terminal</b>		
P303	25045184	HLJ-0520-01-010

**TAPE-1 OPERATION SWITCH (NASW-2444)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>LEDs</b>		
D712, D715, D716	225177	GL3PR28
D713, D714	225179	LG4NG28
D701, D702	225159	SEL-9720MB01
<b>Switch</b>		
S701-S710	25035408	NPS-111-S372
<b>Holder</b>		
	27190409	Holder (LED-1)
	27190410	Holder (LED-4)

**TAPE-2 OPERATION SWITCH (NASW-2445)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Switch</b>		
S711-S717	25035408	NPS-111-S372
S718	25035399	NPS-122-L634

**TIMER SWITCH PC BOARD (NASW-2446)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
S719	25030231	NRS-123-25SBM. Rotary switch



# TAPE MECHANISM—PARTS LIST (T-1)

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	801318	Screw w/washer M2 x 5	46	24602344	Cam gear (B)
2	24600058	Head ass'y	47	24604076	Spacer
3	24611038	Adjusting nut	48	24607039	Bracket (flywheel) II
4	24611021	Tape guide	49	24603325	Lever (reader)
5	24611020	Sensor ass'y	51	24606232	Solenoid coil PKA16122
6	24605484	Adjusting spring (R)	52	838126080	Screw 2.6 x 8
7	24605483	Adjusting spring (L)	53	24611033	Lug ass'y
8	24611176	Plate ass'y (head)	54	24605593	Spring (play arm)
9	24605584	Spring (head base)	55	24607042	Arm ass'y (play)
10	838120130	Wave screw 2 x 13	56	24602351	Main belt
11	87712206	Washer 2.2 x 6 x .4	57	24601191	Motor ass'y (main)
12	24602339	Pinch roller ass'y	58	24601190	Motor ass'y (reel)
13	24605585	Spring (pinch roller) R	59	24611181	Holder (lead)
14	24602349	Pinch roller ass'y	60	24603328	Lever (read)
15	24605598	Spring (pinch roller) L	61	24611137	Rubber cushion
16		Wire connector	62	24605590	Spring
17		Wire connector	63	24605594	Spring (A)
18	24611177	Plastic washer 1.7 x 3.2 x .25	64	24607043	Arm (A)
19	24602340	Reel ass'y	65	24607044	Arm (B)
20	24602345	Take up reel ass'y	66	24611182	Cap
21	24611175	Plastic washer 2.1 x 7 x .25	67	24611034	Reflector
22	24610926	Oil seal	68	24605591	Spring (ground)
23	838130080	Wave screw 3 x 8	69	24607030	Bracket (R)
24	24604048	Spacer	70	24607029	Bracket (L)
25	24607041	Arm (protect) L	71	24607047	Eject arm
26	24605586	Spring (L)	72	24605600	Spring eject arm
27	24603326	Lever (hold) C	73		Wire connector, 2P
28	833130047	Tap-tight screw 113 x 4	74	24611192	Cassette holder ass'y
29	24604075	Tube	75	24611174	Plate
30		Wire connector, 8P	76	24606234	P.C.B. ass'y
31	24606235	Push switch	77	82113057	Tap-tight screw M3 x 5
32	24611191	Chassis ass'y	78	82112047	Tap-tight screw M2 x 4
33	24602342	Idler ass'y	79	24607040	Bracket (P.C.B.)
35	24605587	Spring (hold)	81	82113006	Tap-tight screw M3 x 6
36	24605588	Spring (cassette)	82	24611193	Damper ass'y
37	801355	Screw/w M2.6 x 3.5	83	833120127	Tap tight screw M2 x 12
38	24611178	Cap	84	801293	Tap tight screw M2.6 x 12
39	24611179	Plate ass'y (slide)	85	24602352	Flywheel ass'y
40	24605589	Spring (slide)	86	24611188	Oil seal $\phi$ 2.2
41	24606231	Leaf switch	87	24611189	Bainder
42	838120070	Wave screw 2 x 7	88	24605599	Spring
43	24611180	Base ass'y (sensor)	89	801340	Screw (motor)
44	24611041	Plastic washer 2.6 x 0.25			
45	24602343	Flywheel ass'y			

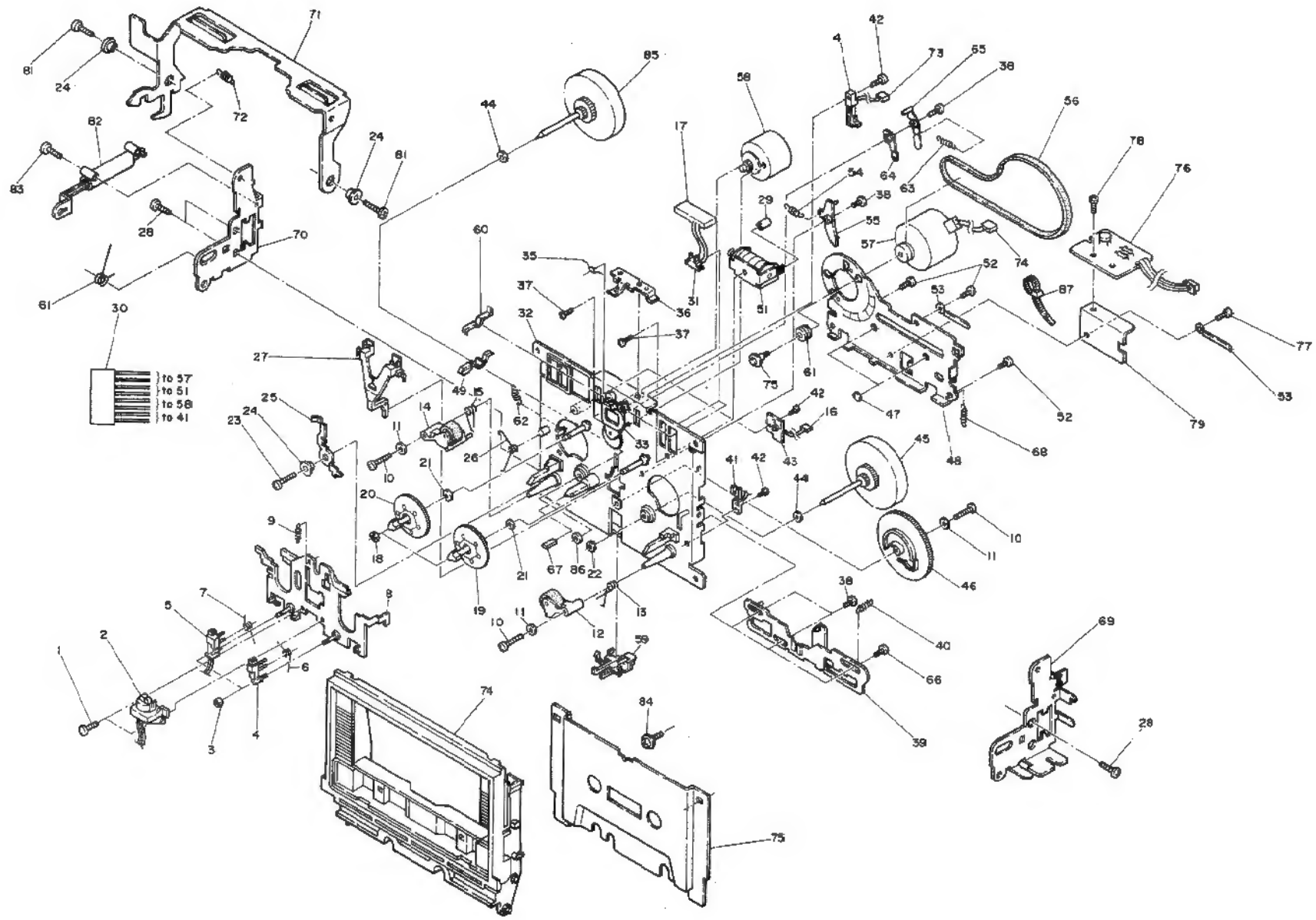
# TAPE MECHANISM—PARTS LIST (T-2)

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	801318	Screw w/washer M2 x 5	46	24602344	Cam gear (B)
2	24600057	Head ass'y	47	24604076	Spacer
3	24611038	Adjusting nut	48	24607039	Bracket (flywheel) B
4	24611021	Tape guide	49	24603330	Lever (reader)
5	24611020	Sensor ass'y	50	24603329	Lever (reader)
6	24605484	Adjusting spring (R)	51	24606232	Solenoid coil PKA16122
7	24605483	Adjusting spring (L)	52	838126080	Screw 2.6 x 8
8	24611176	Plate ass'y (head)	53	24611033	Lug ass'y
9	24605584	Spring (head base)	54	24605593	Spring (play arm)
10	838120130	Wave screw 2 x 13	55	24607042	Arm ass'y (play)
11	87712206	Washer 2.2 x 6 x .4	56	24602351	Main belt
12	24602339	Pinch roller ass'y	57	24601191	Motor ass'y (main)
13	24605585	Spring (pinch roller) III	58	24601190	Motor ass'y (reel)
14	24602349	Pinch roller ass'y	59	24611181	Holder (lead)
15	24605598	Spring (pinch roller) L	60	24603328	Lever (read)
16		Wire connector	61	24611137	Rubber cushion
17		Wire connector	62	24605590	Spring
18	24611177	Plastic washer 1.7 x 3.2 x .25	63	24605594	Spring (A)
19	24602353	Reel ass'y	64	24607043	Arm (A)
20	24602345	Take up reel ass'y	65	24607044	Arm (B)
21	24611175	Plastic washer 2.1 x 7 x .25	66	24611182	Cap
22	24610926	Oil seal	67	24611034	Reflector
23	838130080	Wave screw 3 x 8	68	24605591	Spring (ground)
24	24604048	Spacer	69	24607030	Bracket (R)
25	24607041	Arm (protect) L	70	24607029	Bracket (L)
26	24605586	Spring (L)	71	24607047	Eject arm
27	24603326	Lever (hold) C	72	24605600	Spring eject arm
28	833130047	Tap-tight screw 113 x 4	73		Wire connector
29	24604075	Tube	74	24611192	Cassette holder ass'y
30		Wire connector, 8P	75	24611174	Plate
31	24606235	Push switch	76	24606237	P.C.B. ass'y
32	24611191	Chassis ass'y	77	82113057	Tap-tight screw M3 x 5
33	24602342	Idler ass'y	78	82112047	Tap-tight screw M2 x 4
34	24606236	Push switch	79	24607040	Bracket (P.C.B.)
35	24605587	Spring (hold)	80	24602348	Belt (counter)
36	24605588	Spring (cassette)	81	82113006	Tap-tight screw M3 x 6
37	801355	Screw/w M2.6 x 3.5	82	24611193	Danper ass'y
38	24611178	Cap	83	833120127	Tap tight screw M2 x 12
39	24611179	Plate ass'y (slide)	84	801293	Tap tight screw M2.6 x 12
40	24605589	Spring (slide)	85	24602352	Flywheel ass'y
41	24606231	Leaf switch	86	24611188	Oil seal $\phi$ 2.2
42	838120070	Wave screw 2 x 7	87	24611189	Bairder
43	24611180	Base ass'y (sensor)	88	24605599	Spring
44	24611041	Plastic washer 2.6 x 0.25	89	801340	Screw (motor)
45	24602343	Flywheel ass'y			

A B C D E F G

TAPE MECHANISM—EXPLODED VIEW (T-1)

1  
2  
3  
4  
5





TA-RW99

A B C D E F G

# TAPE MECHANISM—EXPLODED VIEW (T-2)

